

A green-tinted photograph of a beach scene. In the foreground, there are sand dunes with sparse vegetation. A series of wooden fences, made of vertical slats, are built across the dunes, extending from the left towards the right. In the background, the ocean is visible under a hazy sky. To the right, some buildings and trees are partially visible.

DHEC'S OFFICE OF OCEAN AND
COASTAL RESOURCE MANAGEMENT

HOW TO BUILD A DUNE

INTRODUCTION

"How to Build a Dune" is a how-to manual for those who want to preserve South Carolina's beaches. This booklet contains instructions for projects that help nature increase the size and stamina of sand dunes.

For each project the basic principles are the same: help nature without completely replacing it; fit the dune into natural dune patterns; allow room for the dune to adjust to the natural dynamics of the area; and prevent damage by beach users whenever possible.

Each stretch of beach is unique so care must be taken when deciding which dune building method is right for your situation. A project may work in one area only to be useless in another. Erosion rates, coupled with initial cost and projected maintenance requirements, are important to consider.

In some areas high erosion rates and narrow beaches make some building projects unfeasible.

Before beginning any beach enhancement/protection project you need to determine which federal, state or local permits are needed. Personnel from DHEC's Office of Ocean and Coastal Resource Management in Charleston, Myrtle Beach and Beaufort will be happy to answer many of your questions.



SAND DUNE DYNAMICS

Shorelines are constantly moving and changing. A stretch of beach may be beautifully wide one season and yet show signs of erosion the next. An understanding of the sand exchange system explains this phenomenon.

During the winter, strong winds and stormy weather cause large, powerful ocean waves to form. As these waves pound the beach, sand erodes and is deposited on offshore bars. The beach narrows.

Conditions change beginning in early spring. Milder waves and winds wash over the beach, bringing back the sand. Gradually the shore becomes wider.

In an ideal situation, this summer accretion and winter erosion counteracts each other. The beach remains about the same size, year after year. Very rarely, however, is a situation ideal. Quite frequently the erosional portion of the cycle prevails. The beach begins to wash away.

Sand dunes are very helpful during these erosional times. These dunes become sand savings account, providing extra sand that is to be withdrawn every time erosional waves demand it. When this sand reserve is not available, ocean waves often rush upland, taking high ground instead. Even low dunes (2 to 3 feet tall) can mean the difference between simple beach erosion and the destruction of private property.

By using the methods listed in this manual, property owners can increase their sand savings account by helping nature build and stabilize protective sand dunes. Portions of these newly created dunes will erode in the same manner as a "natural" dune, but much of the sand should return the next season.



PLANTING A DUNE

One of the most effective and aesthetically pleasing ways to build and stabilize a sand dune is to cover it with vegetation. The foliage helps increase the size of the dune by trapping wind blown sand. Plant roots also contribute as they bind sand particles to the dune.

Very few plants can live within the harsh beach environment. The vegetation must be able to withstand large blasts and accumulations of sand and salt spray. Nutrients are scarce. Droughts are severe and scorching heat waves are frequent.

Fortunately, three types of herbaceous grasses are suited to flourish on the beaches of South Carolina.

AMERICAN BEACHGRASS

This strain is an excellent dune stabilizer that is easily transplanted. Beachgrass grows rapidly and can effectively trap sand by the middle of its first growing season. The Hatterus variety is especially hardy and is available commercially.

Beachgrass should be planted from November through April, with the earlier days preferred. The plants should be installed to a dept of 8 to 10 inches, with the center portion of a plot having 18 inch spacing between plants, widening to 3 to 4 feet apart at the base. This varied spacing allows blowing sand to better penetrate tall areas thereby building a wider, flatter dune.

Sprigging should be done by hand, making sure each plant is secure in the sand. As a rough guide for planting, remember that 1,000 plants should cover a 50 by 100 foot strip.

American beachgrass is susceptible to both disease and insects, so intermingle this plant with panicum and sea oats.



SEA OATS

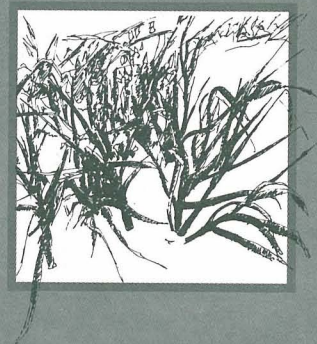
A strong plant, sea oats are drought and heat tolerant and relatively free of pest. Sea oats resemble American beachgrass but die back in the winter. Plant this grass from March to June to a depth of 8 to 10 inches. Sprig according to the direction given for American beachgrass, taking care to plant the sea oats deep enough in the soil, since this grass thrives with moisture at its roots.

Sea oats are often difficult to find commercially, but mature oats can sometimes be transplanted. This plant is a slow grower, taking two full growing seasons before acting as a dune stabilizer. For this reason, sea oats should be interplanted with American beachgrass.



BITTER PANICUM

Bitter panicum grass is excellent for high and dry sites. The plant is extremely hardy and a rapid grower. Bitter panicum should be planted from March through June at a depth of 6 inches, spaced 18 inches apart. This plant proliferates through rhizomes (runners) and will root at each node on the stem, just like centipede grass. Place the runners in a trench with about 6 to 8 inches protruding from the sand. When planting small plants, use the same methods recommended for American beachgrass.



OTHER PLANTING TIPS

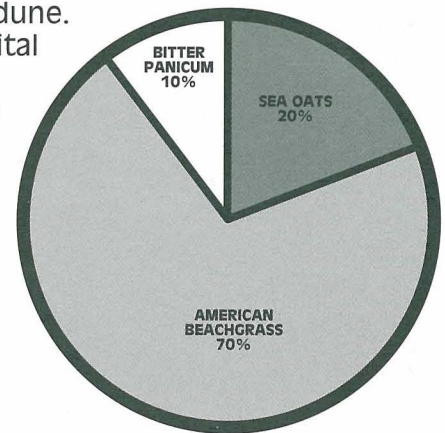
One of the best planting schemes is to combine all three grasses so that the inadequacies of one (slow growth, susceptibility to disease, etc.) can be counteracted by its neighbor. Make approximately 10% of your total planting bitter panicum, 20% sea oats, and the remainder American beachgrass. Plant these mainly on the area of the dune closest to the ocean.

Fertilization is vital to the success of dune plantings, particularly when the plants are starting. Beach sand is deficient in nitrogen, so a high nitrogen formulation (say a 19-8-5 or similar mixture) is recommended. Ten pounds of this fertilizer per 1,000 square feet applied three times during the first growing season will encourage a healthy start. Thereafter, 5 pounds per 1,000 feet twice a season should be sufficient. Fertilizer should be broadcast by hand since ground spreading equipment can damage fragile seedlings.

Irrigating a dune is often not practical and most of the time, not necessary. When the plants do die, leave the remains on the dune. As the plants decay a mulch is created that provides a vital element for future plant growth.

All plantings should take place as far from the surf as feasible. Dunes are an effective "sand savings account" for storm and abnormally high tides, but a dune won't last and vegetation won't grow in an area that is regularly inundated by the sea.

The use of sand fencing will increase the success rate of a dune vegetation project.





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SAND FENCING

The function of sand fencing is to speed accumulation of sand in the location chosen for dune reconstruction. Proper fencing will slow the wind, thereby allowing wind-blown sand grains to drop and collect around the fence.

Commercial sand fencing is available in several forms: fabric, plastic and the common wood and wire "snow fence". Almost any kind of fence can be used provided the structure does not completely block the wind. Don't use either solid or open fencing (such as chicken wire). Fifty per cent of solid material seems to work well. The best height for a fence is approximately two feet. Most commercial fencing comes four feet tall but can easily be cut in half.

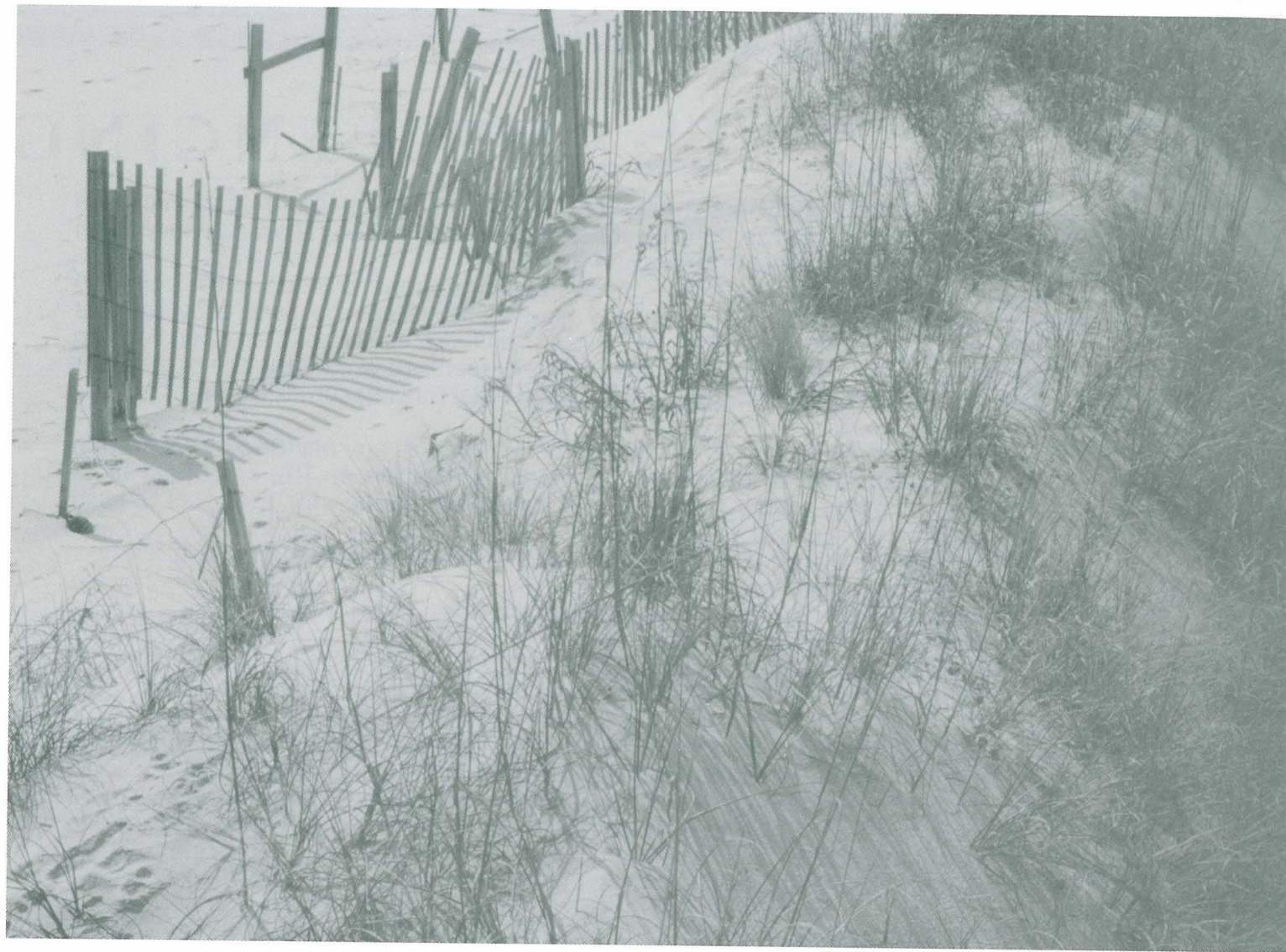
Sand fencing should be put up far enough in advance of any planting of vegetation to allow the sand to build to two-thirds the height of the fence. This height (12 to 18 inches) is deep enough to aid in plant stability by shallow enough for the roots to reach the water tables.

Fencing should be placed within the outline of the planned dune and:

- Above the highest wave uprush
- Not within the range of the seasonal storm tides
- Aligned with any neighboring dunes
- Placed where it won't hinder public access
- Placed so as to not hinder loggerhead turtle nesting.

Where possible, fence ends should tie in with neighboring dunes. As fences are buried, new ones may be erected to increase the size of the dune even further.

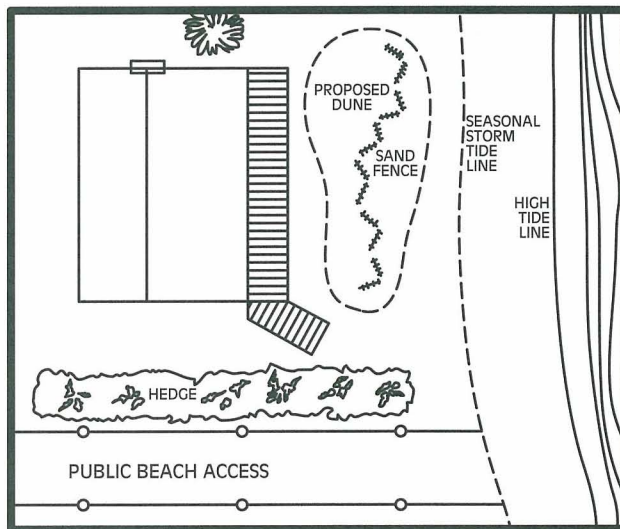
Sand fencing configurations may take many forms. Zigzagging the fence seems to be particularly effective. Parallel fences are also effective, requiring less fencing and are one of the most easy to construct. Make sure that there are breaks in the fencing to allow loggerhead turtles to move freely from the dune to the ocean.



PLAN OF DUNE PLACEMENT

Wooden post will anchor the fence. These should be placed about 10 feet apart (two feet apart is a minimum) and driven into the sand deeply enough to secure it under a load of sand which may gather primary on one side (12- 18 inches).

Another plus for a sand fence is that they seem to make people think twice before crossing a dune. Fences can be erected in such a way as to direct walking traffic to legitimate dune walkovers. An additional insurance policy is to install a sign that asks people to stay off the dunes. A dune walkover (which is discussed in another section) may be necessary.



DUNE WALKOVERS

Pedestrian traffic can do more harm to a dune than most people realize. A walkover, which is a bridge over the dune, saves a lot of unnecessary wear and tear. Dune walkovers may be constructed without a permit from OCRM if they are built according to the following criteria:

- Must be constructed of wood
- Can be no wider than six feet
- Must follow the existing dune contours
- Must not displace sand
- Must be constructed with as little environmental damage as possible.

Placing sand fencing around the walkover will encourage beach goers to use the dune walkover.

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